

Northern Pacific Railroad Overhead Bridge
(Burlington Northern Railroad Overhead Bridge)
Spanning the Burlington Northern Railroad, south of
the intersection of Main Street West and 7th Avenue
Mandan
Morton County
North Dakota

HAER No. ND-6

HAER
ND
30-MAN,
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Rocky Mountain Regional Office
U.S. Department of the Interior
P.O. Box 25287
Denver, Colorado 80225

HISTORIC AMERICAN ENGINEERING RECORD

Northern Pacific Railroad Overhead Bridge
(Burlington Northern Railroad Overhead Bridge)
HAER No. ND-6

HAER
ND
30-MAN,
1-

Location: Spanning the Burlington Northern Railroad, 211.5 feet west and 12 feet south of the intersection of Main Street West and 7th Avenue
Mandan, Morton County, North Dakota

UTM: 14.5187160.354940
Quad: Mandan, North Dakota

Date of Construction: 1933 (no modifications)

Builder: Clinton Bridge Works
Clinton, Iowa

Present Owner: State of North Dakota Department of Transportation
Bismarck, North Dakota

Present Use: Vehicular and pedestrian bridge, to be replaced by a new vehicular and pedestrian bridge. Projected date of removal is spring 1991.

Significance: The Burlington Northern Railroad Overhead Bridge was a two-span and the only skewed, steel, Warren through truss bridge in North Dakota. Construction was funded by emergency Federal funds during the Great Depression as a make-work project.

Historian: Kent N. Good
Department of Transportation

August 1990

I. HISTORICAL INFORMATION

A. The Depression, "The National Picture"

It seems odd to consider the period between 1929 and 1938 as anything other than "Drought and Depression"; however, road building and structure construction was one facet of the economy that saw much activity. After the collapse of the stock market in 1929, the economic system of the United States began to decay and break down. Agricultural areas of the Plains were particularly hard hit, as the drought added "fuel to the fire of depression."¹ Relief seemed to be a "double-edge sword." The Federal Government, under the Roosevelt Administration, was dedicated to using the strength of the nation's resources to improve the economy. Huge expenditures for relief were made, with programs being implemented to save agricultural areas of the country, including North Dakota.

B. Unmatched Federal Aid

In 1930, Congress significantly increased Federal aid to the states. North Dakota had been getting \$1.2 million annually from the Federal Government during the 1920s. In 1930, this was increased to \$2 million, but the state was unable to match the amount. At the same time, the North Dakota Highway Commission was deluged by requests and petitions from county boards for road improvements on the state highway system. Lacking sufficient money to match the \$2 million available in Federal aid, it appeared North Dakota would have to curtail plans for the 1931 construction season. However, in December 1930, the Federal Government gave North Dakota a \$1.3 million advance in Federal appropriation. The Federal Government was actually matching its own money and was, in reality, paying about 75 percent of the cost of construction on the state highway system. Because many county treasuries were insolvent by the early 1930s, they were also unable to provide their normal 25 percent of the construction money. The state highway fund continued to finance a portion of new construction until 1933, when the motor vehicle fees were diverted. For the following six years, the Federal Government financed 100 percent of the highway construction in North Dakota. Although the highway commission had inadequate resources to maintain the roads properly during this period, they began to make a sincere attempt to keep the highways open in the winter which increased maintenance costs considerably.²

From 1930 to 1939, the State Highway Department either administered or supervised the expenditure of \$51.5 million the Federal Government provided as non-matching emergency aid.³ Although not all of this Federal money was spent on the state highway system, it was all spent on road work of one kind or another. Thousands of men in every part of the state were employed to do the road work

Most of the Federal aid that poured into North Dakota for road related construction was intended for relief. The primary objective was to get money circulating in the economy again and to ease the poverty in the state. The highway commission had recognized the need to ease

Northern Pacific Railroad Overhead Bridge
(Burlington Northern Railroad Overhead Bridge)
HAER No. ND-6
(Page 3)

unemployment in early 1932 when it adopted a resolution requesting all contractors to work their men only eight hours a day so that more men might be employed.⁴

C. Unemployment and "Make Work" Projects

As unemployment increased, Congress turned from regular Federal aid for highways to emphasize projects that would employ as much labor as possible. Regular Federal appropriations were replaced with emergency appropriations under which employment of people, not necessarily highway construction, was first priority. Throughout the Depression, road work and construction were the major form of relief employment in the impoverished state. The North Dakota Highway Department employed approximately 80 percent of the labor on all its projects from the relief list.⁵

With the \$2 million in emergency aid and an equal sum in regular aid, North Dakota needed to put the money into circulation. The highway department worked overtime to get the money under contract quickly. The 1932 grant stipulated no laborer paid with Federal aid money could work more than 30 hours a week. This insured the hiring and employment of the maximum number of individuals. Minimum wage was 40 cents per hour for common labor, 50 cents an hour for skilled labor. Contractors were forbidden to charge more than 80 cents per day for room and board.⁶

D. The Bridge (Emergency Funding, A "Make-Work" Project)

The construction of the North Pacific Railroad Overhead Bridge (Project No. F.A.P. 251-E) was in response to the emergency funding program, which stipulated that the work covered by the contract be conducted in such a manner so as to maximize employment.

This particular project employed those individuals listed with the Morton County Employment Committee, giving preference in selections from the list, where qualified, to ex-servicemen with dependents. The contractor informed the County Employment Committee of his needs for labor and requested a list of names from which he could select his requirements. If the committee failed to supply lists within 48 hours after the receipt of such request, the contractor was free to employ any available labor. Qualified ex-servicemen with dependents, other labor living in the county, and adjacent counties in the state were given preference in employment.⁷

Since the new bridge was to replace an aging Howe Through truss over the railroad tracks, and because the Northern Pacific Railroad was expanding the size of the yard, they agreed to fund a portion of the project. The expansion was due to the introduction of the Series 5000 locomotive which was capable of pulling greater numbers of cars.⁸ More space was needed to accommodate longer trains and the increase in rail traffic. The total cost of construction was \$55,000 and was being funded by 50 percent Federal aid money and 50 percent railroad money. Construction was completed and the bridge opened for traffic on August 22, 1933.⁹

E. The Bridge Structure

The Northern Pacific Railroad Overhead Bridge is a Warren Through truss. This type of structure was patented in 1848 by James Warren and Theobald Willoughby Monsani, two British engineers, and was quickly adopted by American bridge designers. The basic Warren truss is triangular in outline, with diagonals carrying both compressive and tensile forces.¹⁰ The Northern Pacific Overhead Bridge had the addition of verticals which served as bracing for triangular top lateral or web bracing systems.

The piers and abutments are constructed of steel reinforced concrete, with the bearing point resting directly on the concrete surface of the piers. Four piers comprise the support for the truss and approach structure.

The structure consists of four piers, three approach spans, two Warren Through trusses, and three steel "I" beam spans. The truss spans are 132 feet 8 inches and 152 feet 4 inches. The "I" beam spans are 40 feet, 38 feet 2 inches, and 40 feet. The roadway clearance is 24 feet curb to curb, with a deck clearance of 25 feet 5 inches. The deck is constructed of concrete. The vertical clearance over the deck is 17 feet 3 inches and the clearance over the railroad tracks is 35 feet. The sidewalk, located on the west side of the structure, is 6 feet wide and supported by an expansion bracket. The total length of the structure, including the approaches, is 409 feet.

Pin connections are used at fixed bearings and at the rocker bearings. All other connections of major structural members are riveted. These include channels and gussets forming the endpost, and including connections of the top and bottom chords, hip verticals, diagonals, and portal bracing, portal struts, and top lateral bracing.

Architecturally, the structure is unique, in that the trusses are skewed to the piers which are parallel to the railroad tracks. The deck and bridge structure was designed to be skewed toward the southwest, giving an opportunity for a "Y" approach to the bridge from the south rather than 90 degree approaches, especially from the west (10th Avenue Southwest and 1st Street Southwest), which is the main route through Mandan from the south. The skewed design also gives an easier access to the north approach of the bridge from the east along West Main Street. This need for a skewed design resulted in an atypical Warren Through truss bridge.

The skewed design resulted in the bottom chords being offset, but of equal length, which in turn resulted in the endposts across from each other (east and west sides) being at different angles to the top chord. The length of the bottom chord, between the last hip vertical and the endpost is 23 feet 9 inches on one side and 13 feet 11 inches on the other. The same measurements and endpost angle to the top chord occurred in reverse order at the opposite end of the 133-foot truss span (south truss).

The north 153-foot truss span offers a similar situation, but since the span was greater and an equal size truss was used, an unique innovation was employed. At opposite corners (the

Northern Pacific Railroad Overhead Bridge
(Burlington Northern Railroad Overhead Bridge)
HAER No. ND-6
(Page 5)

southwest and northeast), the top chord was increased by 23 feet 9 inches to form an additional panel. An additional lateral brace was attached to intersection of the endpost, hip vertical and diagonal brace. This top lateral brace was in turn attached to an additional hip vertical and endpost. This situation occurred at opposing corners of the structure. Since the extension of the top chord was equal to that of the distance between other verticals, it was considered a four-panel structure and the truss, just described, was considered a five-panel structures {see HAER Photographs No. ND-6-1 through ND-6-7}.

F. Project Information

The Northern Pacific Railroad Overhead is owned and maintained by the North Dakota State Highway Department (Department of Transportation) and had always been a part of North Dakota State Highway Six. Originally designed as a "trunk highway system," today it is designated as a minor arterial highway which begins at the North Dakota-South Dakota border and terminates at the Northern Pacific Railroad Overhead Bridge No. 006-067.352.

Inspections of the bridge in 1974, 1979, and 1988 included items such as "a dangerous Y intersection" formed by the converging of 10th Avenue Southwest and 8th Avenue Southwest. The result of the 1988 inspection concluded that the concrete was failing and the deck showed extensive wear. All steel was rusting, as the structure was never repainted. Spalling of the concrete was evident under the bearing plates and on the bottom of the floor between the "I" beams. Cracking had occurred at both abutments and some erosion had taken place under the south abutment.¹¹

A highway improvement project of Highway No. 6 was proposed as early as 1979, but was not finalized until July 1987. The project included the reconstruction of the existing railroad overpass (Northern Pacific Railroad Overhead Bridge/Burlington Northern Railroad Overhead Bridge) and the approach roadway between Main Street and 3rd Street south. The project (no. RRS-1-006(004)067) was let for bid in December 1989. Wanzek Construction Company, Inc., Fargo, North Dakota, was awarded the contract. The completion date for the construction of the highway project is October 1991. A cost of \$1,312,280, consisting of 90 percent Federal aid funds and 10 percent Mandan City funds, has been estimated for the construction of the bridge. The North Dakota Department of Transportation is responsible for the project.

The bridge was determined to be a historically significant by the North Dakota State Historical Society in 1987. Following the guidelines of the Section 106 process eventually led to recordation of the structure by the Historic American Engineering Record (HAER). The documentation was completed by Kent Good, Archeologist/Historian for the North Dakota Department of Transportation. Documentation was completed during the summer and fall of 1990.

II. BIOGRAPHICAL MATERIAL

A. H. C. Frahm (1883-1940)

H. C. Frahm, State Engineer from 1925 to 1927 and Chief Engineer from 1927-1937, was born on a farm near Rochester, Minnesota, on July 17, 1883. His father had come to the United States at the age of two years and as an adult homesteaded near Rochester. His mother's family originated from New York before coming to Minnesota.

H. C. Frahm graduated from Rochester High School in 1901 and entered the civil engineering department of the University of Minnesota, where he was a student for two years. Leaving the school in 1903, he served as mechanical draftsman for a Minneapolis firm for four years. He then returned to the University of Minnesota to take special courses for a year and a half. Once again, he left the university and was employed by the Great Northern Railroad, Minot Division. He remained with the railroad for a year and then established a general practice as a civil engineer, with headquarters at Minot. From 1910 to 1922, he was county surveyor of Ward County.

In 1922, he was appointed division engineer for the North Dakota Highway Department, with headquarters at Minot. North Dakota Governor A. G. Sorlie appointed Frahm to be state engineer and a member of the State Highway Commission. By virtue of the appointment as state engineer, he was ex-officio chief engineer of the highway department.

In 1927, the highway department was reorganized and Mr. Frahm became its chief engineer by appointment. He continued with the highway department until 1937 when he resigned. It was during the period as chief engineer that he was involved with the planning of the Burlington Northern Overhead structure. During the last years of his life, Mr. Frahm was assistant to the chief engineer of the State Water Conservation Commission.¹²

B. Milton L. Rue, Sr. (1899-1968)

"Mr. Republican," as many referred to him, Milton Rue was born in Red Lake Falls, Minnesota, on September 26, 1899, and moved to a farm in Trygg Township some 35 miles northeast of Bismarck in 1906. He attended public schools in Burleigh County, Valley City Teachers College, and the Interstate Business College at Fargo, North Dakota.

In 1917, at the age of 18, Rue joined the Army and served in the field artillery, including seven months in France. When he returned to Burleigh County in 1919, Mr. Rue pursued the construction business with his father, John, and eldest brother, Erwin. Their first project was a bridge on a county road near the Rue farm.

In 1924, the Rues moved to Bismarck, North Dakota, and founded the J. J. Rue and Sons Construction Company. The company concentrated on bridge work, but also doing some sewer

Northern Pacific Railroad Overhead Bridge
(Burlington Northern Railroad Overhead Bridge)
HAER No. ND-6
(Page 7)

and water main construction in North Dakota, Montana, South Dakota, and Minnesota. After their father's death, the company became known first as Rue Brothers, then Rue Construction Company, operated by Milton and his brother, Charles (C. W. Rue). Charles later left the business and founded Rue Contracting Company of Fargo, North Dakota.

Milton Rue was engaged in the highway construction business longer than any other North Dakota contractor. On Interstate 94, across North Dakota, there are 83 Rue-built structures, and at one time Rue estimated that during his lifetime the company had constructed approximately 750 bridges.

In 1953, Rue was elected president *pro tem* of the State Senate, the only Burleigh County lawmaker to hold the post at that time. While maintaining his political base in Burleigh County, Rue also became interested in state politics, starting as a successful campaign manager for the Republican Organizing Committee in 1944.

As with many individuals who are involved in business and politics, Rue was involved in many civic endeavors, serving as director of the First National Bank, as director and as a member of the executive committee of the Provident Life Insurance Company, and as a director of Bismarck Building and Loan Association. As an involved individual in the community, he contributed generously to a number of community projects. As a contractor and builder, Rue had a compulsion to create, develop and bring order to chaos.¹³

C. Clinton Bridge Works (1868-1983)

Very little information was found concerning the fabricator of the Burlington Northern Overhead Bridge. No information regarding the company was included in the original plans or contract. A letter concerning a late payment to the company was found during the search of the contract and proposal prepared by the Rue Brothers Construction Company. The letter was addressed to Frank Vogel, North Dakota State Highway Department.

"You are hereby notified that Joe D. Simons of Mandan, North Dakota, who was a contractor on Federal Aid Project No. 251 in Morton County, North Dakota, with the Highway Commission, and Highway Department of North Dakota, has failed to pay the Clinton Bridge Works."¹⁴

This is the only reference to the company that fabricated the structure steel members of the bridge. The company was founded in 1868 by Chancey and Artemus Lamb under the name of the "Clinton Bridge and Iron Works," Clinton, Iowa.¹⁵ By 1933, the company was known as the Clinton Bridge Works. In the 1960s, several bridge fabricators were combined under the "Allied Structural Steel Company," with a branch office in Clinton, Iowa. The "doors were closed" on the Clinton office in 1983 and, the following year, Allied Structure Steel Company was purchased by Trinity Industries, Inc., of Dallas, Texas. Trinity Industries has no record of the Clinton Bridge Works.¹⁶

D. Location and Name Change

At the time the bridge was completed, it was referred to as the Northern Pacific Railroad Overhead Bridge and the Northern Pacific Railroad Viaduct. In 1970, the Northern Pacific, Great Northern, and the Chicago Burlington Quincy railroads were combined to form the Burlington Northern Railroad. From that time on, the bridge was known as the Burlington Northern Railroad Overhead Bridge.

III. ENDNOTES

1. Elwyn B. Robinson, History of North Dakota, Lincoln, Nebraska: University of Nebraska Press, 1966, p. 397.
2. Larry J. Sprunk and Robert L. Carlson, History of the North Dakota Highway Department, North Dakota State Highway Department Press, 1979, p. 55.
3. North Dakota, Report of the Highway Commissioner, Public Documents of North Dakota (1930-1940).
4. North Dakota, Public Documents (1933-1934).
5. North Dakota, Public Documents (1930-1935), p. 4406.
6. North Dakota, North Dakota Highway Bulletin, North Dakota State University Press, July 1932, p. 3.
7. North Dakota Department of Transportation Archives "Rue Brothers Construction Company Contract," Project No. F.A.P. 251-E.
8. Frank Vysralek, Great Plains Research, Interview held in Bismarck, North Dakota, August 1990.
9. Bismarck Capitol Newspaper, August 22, 1933, p. 1.
10. T. Allan Comp and Donald C. Jackson, "Bridge Truss Types," Historic News Technical Leaflet #95, Vol. 32, No. 5, May 1977.
11. North Dakota Department of Transportation. Bridge Division Files, Bridge File No. 6-067.466.
12. Bismarck Tribune, November 18, 1940, p. 2.
13. Bismarck Tribune, May 31, 1968, p. 1.

14. NDDOT Archives Microfilm Non-payment Letter," Project No. F.A.P. 251-E.
15. Clayton Fraser, FraserDesign, Loveland, Colorado. Telephone interview, August 1990.
15. Tom Guzek, Trinity Industries, Inc., Dallas, Texas. Telephone interview, August 1990.

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F. Periodicals

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G. Unpublished Sources

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